

**FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT**



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Office of Science, Office of Biological and Environmental Research

Environmental Remediation Science Program

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NOTE: NEW REQUIREMENTS FOR GRANTS.GOV

Where to Submit:

Applications must be submitted through Grants.gov to be considered for award.

Registration Requirements:

There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See www.grants.gov/GetStarted. Use the Grants.gov Organization Registration Checklist at www.grants.gov/assets/OrganizationRegCheck.doc to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 14 days to complete these requirements. It is suggested that the process be started as soon as possible.

Questions:

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. Part VII of this announcement explains how to submit other questions to the U.S. Department of Energy.

Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. You will know that your application has reached DOE when the AOR receives email Number 4. You will need the Submission Receipt Number (email Number 1) to track a submission. The titles of the four e-mails are:

Number 1 - Grants.gov Submission Receipt Number

Number 2 - Grants.gov Submission Validation Receipt for Application Number

Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

After receipt of email Number 4, you can view your application at DOE's e-Center, <http://e-center.doe.gov>. A User Id and password are required. If you already have a User Id and password you do not need to re-register.

VERY IMPORTANT – Download PureEdge Viewer:

In order to download the application package, you will need to install PureEdge Viewer. This small, free program will allow you to access, complete, and submit applications electronically and securely. For a free version of the software, visit the following web site: www.grants.gov/DownloadViewer.

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PART I – FUNDING OPPORTUNITY DESCRIPTION

SUMMARY: The Office of Biological and Environmental Research (OBER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces interest in receiving applications for research grants in the Environmental Remediation Sciences Program (ERSP). The goal of the ERSP is to support innovative, fundamental research investigating coupled chemical, biological and physical processes affecting the transport of DOE-relevant contaminants within the subsurface at DOE sites leading to new or improved subsurface remediation techniques and a sound foundation for remedial action decisions important to long-term site stewardship. This solicitation addresses several science elements previously addressed under the Natural and Accelerated Bioremediation Research (NABIR) program and the Environmental Management Science Program (EMSP) and reflects the merger of these two programs into the ERSP. Applications should address hypothesis-driven research to define biologically-mediated and/or hydrogeochemical processes influencing the form and mobility of DOE contaminants and provide the basis for development of new remediation concepts or strategies for long term stewardship. **Applications should address the applicability of the proposed research to DOE relevant contaminant transport processes occurring in the field.** The environment of interest is the terrestrial subsurface below the zone of root influence including both the vadose zone (unsaturated) and the saturated zone (groundwater and sediments). Phytoremediation is not addressed in this Notice. Specific Science Elements of interest to this Notice include: 1) Subsurface Biogeochemistry; 2) Subsurface Microbial Ecology and Community Dynamics; 3) Innovative Field-scale Remediation and Long-Term Stewardship Research; 4) Novel Measurement and Monitoring Concepts, and; 5) Exploratory Research.

BACKGROUND INFORMATION

The Department of Energy oversees some of the largest environmental cleanup operations in the world. Cold War Era processing of uranium for nuclear power and weapons has left an enduring legacy of over 6 billion cubic meters of contaminated soil, groundwater and other environmental media requiring innovative solutions to cleanup, manage and monitor contaminants found at DOE sites (NRC, 2000). The Environmental Remediation Sciences Division (ERSD) within the Office of Biological and Environmental Research (BER) is tasked with developing the fundamental scientific basis for understanding the fate and transport of contaminants in the subsurface. This task is guided by the ERSD long term performance measure to “provide (by 2015) sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes into decision making for environmental remediation.” In order to meet this measure the ERSD will fund multi-disciplinary research in a variety of science areas investigating key processes affecting the mobility of subsurface contaminants found at DOE sites. On October 1, 2005, ERSD’s Natural and Accelerated Bioremediation Research (NABIR) program and the Environmental Management Science Program (EMSP) were merged to create the Environmental Remediation Sciences Program (ERSP), in accordance with Congressional direction. This is the first solicitation of the new ERSP and represents DOE’s interest in continuing to support and build on the substantial research progress developed under the former NABIR and EMSP programs to address some of the nation’s most difficult environmental problems.

Subsurface Contamination Research Needs

Legacy subsurface contamination at current and former processing and storage sites of radioactive materials presents an enormous technical, scientific and financial challenge for the Department of Energy and the nation as a whole. While technologies exist for dismantling and decommissioning physical surface structures such as contaminated buildings and former support structures, contaminants that have entered the subsurface are exceptionally difficult to clean up. This is particularly true for those contaminants spread over wide areas and whose potent toxicity and persistence requires removal to very low levels. Radionuclides, products of nuclear fuel and weapons manufacture, fall into this category of contaminants and are of particular concern to DOE cleanup operations in addition to other contaminant metals and non-aqueous phase liquids (NAPLs) also found at DOE sites.

The projected performance of subsurface remediation techniques and long term stewardship strategies is often based on insufficient knowledge of the transport behavior of contaminants in the subsurface and the mechanisms of contaminant transformation. As a result, many *in situ* strategies often do not meet performance expectations and exceed both cost and time schedule estimates. Consequently, it is likely that at many sites subsurface contamination will remain long after surface remediation measures have been completed (DOE, 2001; NRC, 2000). It is therefore imperative that DOE understand the factors that affect contaminant mobility and transformation within the subsurface in order to devise new remediation and long term monitoring strategies and to provide realistic assessments of the threat posed by subsurface contamination. These tasks will require significant advances in our understanding of key factors affecting the mobility and fate of contaminants in the subsurface. Additionally, these tasks will require the development of innovative tools for detecting, monitoring, modeling and stabilizing contaminants *in situ*, as well as novel techniques for removing contaminants from the subsurface.

Within the former NABIR and EMSP programs substantial progress has been made in evaluating the biogeochemical relationships among DOE relevant contaminants and the subsurface environment. Numerous applications of analytical techniques at the molecular scale have revealed previously unknown aqueous and solid phase-associated complexes of DOE-relevant contaminants, binding mechanisms to naturally-occurring minerals or organic matter and sequestration deep within pore structures of subsurface materials. At larger scales, applications of advanced subsurface detection techniques and isotope analyses have provided new insights into the location, mobility and speciation of subsurface contaminants. Mineral transformation studies have yielded a wealth of information on the potential for chemical additives and native microorganisms to transform geochemical conditions within subsurface materials to reduce, transform and/or sequester contaminants. These examples and many others have contributed to a growing body of literature on the speciation, transformation, sorption chemistry and precipitation/dissolution behavior of contaminants found in the subsurface at DOE sites. These analyses are crucial to understanding the transport behavior of contaminants under a variety of biogeochemical conditions likely to be found in the contaminated subsurface and have contributed new insights into potential techniques for immobilizing or transforming contaminants *in situ*. The ERSP will continue to support research activities that contribute to a better understanding of the biogeochemical nature of DOE relevant contaminants in the subsurface.

In addition to geochemical effects on transport, the activity of subsurface microbial communities can have a profound affect on the mobility of the contaminants in the subsurface. Many microorganisms are known to directly and/or indirectly facilitate the complexation, reduction,

transformation, biomineralization and sequestration of DOE relevant contaminants. Stimulating microbial activity *in situ* is the basis for several promising subsurface remediation techniques (http://www.lbl.gov/NABIR/generalinfo/03_NABIR_primer.pdf). However, these techniques are still largely guided by empirical knowledge of the functioning of the subsurface microbial communities. While detailed physiological studies of subsurface isolates continue to provide new insights into the potential mechanisms of contaminant transformation by subsurface microorganisms much remains to be done. Recent advances in molecular biology continue to provide new insights into the genetic basis for microbially mediated subsurface processes and there is a need to understand the functioning of subsurface microbial communities from a more mechanistic perspective. Several projects associated with the former NABIR program are conducting detailed studies of the metabolism of metal-reducing bacteria in order to understand and model the microbial respiration of insoluble metal oxides and radionuclides. Similar studies are being conducted with sulfate-reducing organisms found in the subsurface, which also are known to reduce metals and radionuclides, as well as fermentative organisms and organisms capable of respiring halogenated organics. These detailed physiological studies of microbes native to contaminated environments coupled with advanced techniques for detecting whole communities of organisms, or even a subset of targeted genes, are providing mechanistic descriptions of microbial processes in subsurface environments.

The application of these genome-enabled techniques to environmental processes at the field scale is an important link between the ERSP, the Genomics:GTL program (<http://doegenomestolife.org/>) and microbial genome sequencing efforts at the Joint Genome Institute (JGI, <http://www.jgi.doe.gov/>). Gene expression techniques coupled with genomic information and *in silico* modeling of multiple species could ultimately provide new tools to understand how microorganisms grow in the subsurface, how growth relates to contaminant transformation activity, nutrient limitations, stress responses, electron donor and acceptor utilization and a host of other metabolic processes likely to be important for understanding and modeling the biological impacts on subsurface contaminant fate and transport. The application of molecular biology and genomics-enabled techniques to a mechanistic understanding of microbially-mediated contaminant transformation processes within the contaminated subsurface will continue to be a focus of the new ERSP.

While understanding the functioning of subsurface microbial communities in the context of the DOE environmental remediation mission is of importance, that mission requires that the ERSP take a broad view of subsurface remediation science. Innovative physical/chemical processes to transform or stabilize DOE relevant contaminants *in situ*, as well as methods to monitor these processes have been a focus within the former EMSP program. Several projects have explored the potential of various oxidants, reductants and nano-sized materials to transform and/or immobilize contaminants of concern to DOE. Additional projects have investigated the fate and transport characteristics of contaminants under conditions of extreme pH, ionic strength and radioactivity found beneath leaking high level waste storage tanks. ERSP will continue to support innovative applications of physical/chemical-based remediation techniques and research that impacts the long term stewardship concerns associated with Legacy Management sites. Coupled projects involving combinations of physical/chemical processes and biological processes are also of interest whether configured together or sequentially. For those sites where contaminants have been stabilized, sequestered or transformed, assessment of the long term stability of contaminants is also of interest to the new program. Additionally, the ERSP will continue to facilitate development of characterization and monitoring techniques designed to

track contaminant migration, delineate subsurface structure and monitor subsurface processes in the field. The intent is to foster close coordination among a diverse suite of subsurface science disciplines to address DOE's subsurface science needs and to meet the ERSD long term performance measure.

Coincident with an improved understanding of subsurface geochemical, biological physical/chemical processes affecting contaminant transport is the need to incorporate this knowledge into models of contaminant transport. Conceptual models, including computational simulation are important elements of the decision-making process for environmental remediation and should reflect current state-of-the-science understanding of factors affecting subsurface fate and transport of contaminants. Additionally, conceptual and computational model development synthesizes current understandings of subsurface processes in a centralized manner and serves as a valuable research tool for exploring new hypotheses of contaminant mobility. Subsurface transport modeling has been a component within both the former EMSP and NABIR programs and will figure prominently in the new ERSP program. This will be particularly true for large, multi-disciplinary projects where the opportunity to synthesize concepts from many scientific disciplines at once is greatest. Recent workshops on reactive transport modeling (Davis et al., 2004) describe the need for multi-disciplinary research projects that incorporate modeling as an essential element of subsurface research. The ERSP portfolio maintains a diverse suite of projects ranging from molecular scale science to field scale investigations. This multi-disciplinary approach should facilitate diverse collaboration among subsurface researchers and advance our understanding of the critical processes that influence or control contaminant fate and transport at the field scale.

While both the former NABIR and EMSP programs made significant contributions to subsurface science and addressed DOE's needs in this area, major challenges remain. Of paramount importance is the linking of molecular scale processes to larger scale processes and ultimately, to processes occurring at the field scale. The ultimate goal of the ERSP is to provide DOE with field scale descriptions of subsurface processes affecting contaminant transport or transformation. Projects funded within the ERSP should progress toward demonstrating the field relevance of processes or techniques under investigation. In order to promote this approach, the ERSP is soliciting applications in several targeted Science Elements addressing the investigation of contaminants of greatest concern to DOE.

The preceding discussion is based on the draft ERSP Strategic Plan, which is available for comment on the ERSD website at http://www.sc.doe.gov/ober/ERSD_top.html.

CURRENT REQUEST FOR APPLICATIONS

Contaminants of Concern

Contaminants of concern across the DOE complex broadly include: radionuclides, metals, nitrates, and nonaqueous phase liquids (NAPLs). Key contaminants (and their mixtures) of interest for the ERSP are:

- Radionuclides: plutonium, strontium-90, cesium-137, technetium-99, iodine-129, neptunium-237, and uranium.
- Non-Radioactive Metals: chromium (VI) and mercury.
- Nitrate as a co-contaminant with the listed radionuclides or non-radioactive metals.

- NAPLs (i.e. carbon tetrachloride, trichloroethylene, dichloroethylene, tetrachloroethylene, chloroform, dichloromethane, and polychlorinated biphenyls) and complexing agents (such as EDTA) as co-contaminants with the listed radionuclides or non-radioactive metals.

A description of the nature and extent of contamination at the principal DOE sites is available at <http://www.nap.edu/books/0309065496/html/index.html/>. More detailed information is available in some cases from the major DOE sites: Hanford (<http://www.hanford.gov>, <http://www.hanford.gov/cp/gpp/>, <http://www.hanford.gov/cp/gpp/science/sandt.cfm>) Idaho National Laboratory (<http://www.inl.gov/subsurface/environmentalissues/vadosezone.shtml>) Oak Ridge Reservation (<http://www.oakridge.doe.gov/External/Default.aspx?tabid=42>) and Savannah River Site (<http://www.srs.gov/general/srs-home.html>, <http://www.srs.gov/general/programs/soil/extpage.html>).

Science Elements

Applications submitted in response to this announcement must address at least one of the ERSP Science Elements listed below. **Each application must clearly identify the Science Element that is most closely aligned with the proposed research.** Both single investigator projects and multi-investigator projects are encouraged within each element. Multi-investigator projects are expected to integrate multiple disciplines into the project. All projects should clearly delineate a hypothesis-driven approach to research and describe how the results of the research would ultimately improve understanding of subsurface processes at the field scale in the context of the DOE cleanup mission. A specific and well documented DOE relevance justification will be an important component of successful applications. Field projects are strongly encouraged to include a contaminant transport modeling component and an innovative monitoring component (such as geophysical methods) as integral parts of the overall research plan.

Subsurface Biogeochemistry

Objective: Develop a fundamental and quantitative understanding of the coupling of biogeochemical processes affecting contaminant transport, reactivity and stability in subsurface environments.

Many factors affect the transport and/or transformation of contaminants found in subsurface environments. Often several competing reactions occur simultaneously and/or produce intermediates of undetermined stability, further complicating overall quantitative descriptions of reactive transport. Additionally, at many DOE sites, DOE-relevant contaminants are found under unusual conditions of pH, ionic strength and redox potentials, and in unusual mixtures. These extreme conditions attenuate as the contaminants travel down gradient resulting in a change in the transport behavior of contaminants. Likewise, various *in situ* remediation techniques produce changes in local geochemical conditions in groundwater or vadose zone settings that directly influence contaminant transport. Also, the metabolic activity of subsurface microorganisms or biofilm communities can profoundly change the geochemical character of contaminants and subsurface materials, either intentionally as part of a remediation technique or as a consequence of the local subsurface conditions.

The ERSP seeks understanding of the most important of the myriad biological and abiological interactions that affect contaminant transport in subsurface environments. This requires the identification and prioritization of key biogeochemical processes needed to predict the extent and

rate of reactions affecting contaminant transport at DOE sites. Insight gained at the molecular scale should be used to interpret or predict processes occurring at larger scales and ultimately along groundwater flowpaths in the subsurface. Refinement of conceptual and/or computational models of contaminant transport based on new geochemical understanding of contaminant mobility and insight of cellular metabolic processes at the microbe-mineral interface is of interest. The emphasis of this science element is on understanding the integral relationships among biological and geochemical processes influencing contaminant transport and/or remediation. Coordination with an ERSP field project is encouraged. The diversity and dynamics of microbial communities in the subsurface are addressed in the *Subsurface Microbial Ecology and Community Dynamics* Science Element. However, multi-investigator projects are encouraged to be cross-cutting across these Science Elements. The contaminants of interest for this Science Element for this Notice are the radionuclide and non-radionuclide metal contaminants listed above as well as nitrate and complexing agents as co-contaminants with the listed radionuclide and non-radionuclide metals. NAPL contaminants are not considered at this time for this Science Element for this Notice.

Areas of interest in this Science Element include:

- Understanding the fundamental chemical nature of reactive mineral surfaces, the biologically induced chemical and redox gradients across mineral-water interfaces and interactions with DOE relevant subsurface contaminants.
- Advanced techniques to assess the form, stability and distribution of immobilized DOE relevant contaminants in subsurface sediments.
- Research to identify and quantify the dominant biogeochemical mechanisms leading to the immobilization and/or remobilization of DOE relevant contaminants within the subsurface.
- Scaling of biogeochemical reactions and gradients, important for understanding the fate and transport of DOE relevant contaminants in the subsurface, occurring at the molecular, mineral surface and pore levels to larger scales.

Funding for single investigator projects under this element up to \$450K/yr is available for a maximum of 3 years. Multi-investigator projects may apply for up to \$600K/yr for a maximum of 3 years. Continued funding is contingent upon progress of the research and on the availability of funds.

Subsurface Microbial Ecology and Community Dynamics

Objective: Develop a quantitative understanding of the growth, activity and structure of subsurface microbial communities affecting contaminant transport.

Microorganisms detected in the subsurface can profoundly alter geochemical conditions along groundwater flowpaths. In addition to indirectly creating conditions hindering contaminant mobility, many microorganisms are known to directly biotransform contaminants to innocuous or immobile forms. This is the basis for several *in situ* bioremediation technologies and natural attenuation mechanisms and may also play a role in the effectiveness of some *in situ* barrier systems. However, the sustained manipulation of subsurface microbial communities to affect contaminant transport and/or degradation is still largely an empirical exercise. Likewise the

microbially-mediated mechanisms of natural attenuation processes and potential microbial involvement in other more physical/chemical *in situ* remediation techniques remain poorly understood. Much remains to be learned about the identity and functioning of subsurface microbial communities relevant to contaminant biotransformation processes. Of particular concern for *in situ* remediation and natural attenuation processes is a mechanistic understanding of how microbial growth and activity quantitatively relate to mineral and contaminant biotransformation. This requires a mechanistic understanding of how microorganisms access/obtain essential nutrients, electron donors and electron acceptors in order to sustain activity. Also, interactions among groups of active microorganisms need to be better understood in order to more fully explain competitive processes and shifts in community structure. Additional techniques are needed to evaluate the distribution of active microbial communities in the contaminated subsurface as well as identification of novel mechanisms of microbially mediated contaminant transformation.

The emphasis of this Science Element is on understanding the functioning of subsurface microbial communities and how their growth and activity affects contaminant fate and transport. Successful applications will address communities involved in metal and radionuclide immobilization/stabilization processes in environments of relevance to DOE. The more geochemical aspects of microbial processes affecting contaminant transport are addressed in the *Subsurface Biogeochemistry* Science Element. However, multi-investigator projects are encouraged to be cross-cutting across both Science Elements. The contaminants of interest for this Science Element for this Notice are the radionuclide and non-radionuclide metal contaminants listed above as well as nitrate and complexing agents as co-contaminants with the listed radionuclide and non-radionuclide metals. NAPL contaminants are not considered at this time for this Science Element for this Notice.

Areas of interest in this Science Element include:

- Techniques to quantitatively identify active members of subsurface microbial communities and relate growth and activity to rates of biogeochemical reactions.
- Methods to quantify rates of contaminant biotransformation by active subsurface microbial communities.
- Molecular or biochemical techniques that assess the nutritional, metabolic activity or specific stress indicators of subsurface microorganisms aiding approaches to understanding the *in situ* biological contributions to contaminant transformation.
- Understanding the biogeochemical factors that govern the distribution and functioning of subsurface microbial communities.
- Improved understanding of the metabolic potential and physiology of subsurface microorganisms catalyzing contaminant transformation and/or the transformation of subsurface materials.

Funding for single investigator projects under this element up to \$450K/yr is available for a maximum of 3 years. Multi-investigator projects may apply for up to \$600K/yr for a maximum of 3 years. Continued funding is contingent upon progress of the research and on the availability of funds.

Innovative Field-scale Remediation and Long-Term Stewardship Research

Objective: Conduct integrative, multi-disciplinary field investigations to test hypotheses of contaminant transformation in the subsurface, measurement and monitoring tools, and conceptual and computational models of contaminant transport.

Field investigations are a crucial component of the ERSP. New insights into the behavior of contaminants under different natural or stimulated biogeochemical conditions in the subsurface ultimately require validation via experimentation in the field. This is an important part of assessing the accuracy of conceptual and/or computational models of subsurface contaminant transport and for determining the relative importance of various biogeochemical mechanisms postulated to affect contaminant transport and/or transformation. *In situ* field investigations also provide an opportunity to test measurement and monitoring tools developed to describe subsurface processes and the functioning of microbial communities. Field research is an inherently multi-disciplinary endeavor encompassing elements of geology, hydrology, geochemistry, geophysics, microbiology, environmental engineering, and/or computer science. Elements of molecular biology and genome-enabled techniques are also increasingly applied to environmental studies.

Of particular concern for this Science Element is the development of integrative, multidisciplinary field investigations of key biogeochemical processes affecting the subsurface transport of DOE relevant contaminants. Applications submitted to this Science Element must be multi-disciplinary in scope and are encouraged to incorporate a contaminant transport modeling component and an innovative monitoring and/or measurement component as integral parts of the project. Researchers should identify sites for investigation that encompass contaminants and conditions relevant to DOE interests, including DOE sites or sites for which DOE retains remediation responsibility. Investigations at other sites will not be considered for funding. Information is available for the principal DOE sites of interest at the web sites listed above (Contaminants of Concern section). Researchers are reminded of the availability of field sites such as the ERSD Field Research Center (FRC) located in Oak Ridge, Tennessee (<http://www.esd.ornl.gov/nabirfrc/>) and of current field research studies at the Old Rifle, Colorado, Uranium Mill Tailings Remedial Action (UMTRA) sites (<http://www.pnl.gov/nabir-umtra/index.stm>) and at the Hanford site (<http://esd.lbl.gov/ERT/hanford100h/index.html>). Field activities such as drilling needs or other infrastructure support will need to be detailed and estimated in applications for work at sites other than the FRC. Applicants intending to submit an application for a field project at the FRC should coordinate with the FRC Manager (<http://public.ornl.gov/nabirfrc/frcadd3.cfm>) for information on current projects and potential collaborations. The contaminants of interest for this Science Element for this Notice are the radionuclide and non-radioactive metal contaminants listed above, as well as nitrate and complexing agents as co-contaminants with the listed radionuclide and non-radioactive metals. NAPL contaminants are not considered at this time for this Science Element for this Notice.

Areas of interest in this Science Element include:

- Integrative field scale experiments testing conceptual models of coupled biological and geochemical processes affecting contaminant fate and transport in the subsurface including immobilization and/or transformation processes.

- Field investigations of the stability of previously immobilized subsurface contaminants.
- New concepts for predicting the long-term performance of *in situ* contaminant immobilization processes.

Multi-investigator, multi-disciplinary projects may apply for up to \$750/yr for a maximum of 3 years. Continued funding is contingent upon progress of the research and on the availability of funds. Applications for work at the FRC need not include drilling and infrastructure support because these are funded separately by ERSD.

Novel Measurement and Monitoring Concepts

Objective: Develop innovative measurement and monitoring techniques for detecting contaminant concentration and speciation, delineating the extent of subsurface contamination and detecting subsurface processes affecting contaminant transport.

Remediation and long term containment or monitoring (e.g. monitored natural attenuation) strategies require innovative measurement and monitoring tools in order to track performance and/or verify containment measures. Applications submitted under this Science Element should describe the applicability of innovative approaches to subsurface measurement or monitoring techniques to the problem of delineating contaminant transport processes in the subsurface and/or evaluating the potential for the long-term success of *in situ* remediation concepts. Areas of interest include non-invasive techniques to delineate subsurface structure, track migration of contaminants in the subsurface, detect groundwater flow and evaluate the rate and progression of biogeochemical processes. Applications examining in-well or subsurface techniques for quantifying the concentration and speciation of contaminants, the extent of microbial activity and rates of biogeochemical processes are also within the scope of this Science Element. All applications should emphasize development of new techniques relevant to the field setting that address crucial measurement needs in support of conceptual/computational models of the subsurface transport processes or *in situ* remediation. Coordination with an ERSP field project is encouraged. The intent is to develop novel measurement and monitoring techniques under situations where direct relevance to conceptual and/or computational model development in a field setting can be demonstrated. Field testing of existing prototype monitoring devices or autonomous sampling systems is not within the scope of this Science Element. The contaminants of interest for this Science Element for this Notice are the radionuclide and non-radionuclide metal contaminants listed above as well as nitrate and complexing agents as co-contaminants with the listed radionuclide and non-radionuclide metals. NAPL contaminants are not considered at this time for this Science Element for this Notice.

Areas of interest in this Science Element include:

- New techniques for detecting and evaluating the rates of key biogeochemical activities of subsurface microorganisms affecting contaminant transport.
- Sensors for evaluating redox, chemical gradients and, mineral or contamination speciation at crucial biogeochemical interfaces.
- Quantitative techniques to measure the distribution and contaminant sorption characteristics of minerals in natural materials.

- High(er) resolution geophysical techniques for evaluating subsurface structure, groundwater flow paths and contaminant transport.
- Novel, field-readable techniques for contaminant detection, speciation and quantification.

Funding for single investigator projects under this element up to \$300K/yr is available for a maximum of 3 years. Multi-investigator projects may apply for up to \$450K/yr for a maximum of 3 years. Continued funding is contingent upon progress of the research and on the availability of funds.

Exploratory Research

Objective: Stimulate initiation of research into new concepts in subsurface science and *in situ* remediation.

The intent of this Science Element is to catalyze the study of new concepts, tools and approaches that could lead to breakthroughs in subsurface remediation science. Emphasis will be on new ideas that offer exceptional promise (high payoff) but also involve substantial risk of failure and hence might not receive funding in the other Science Elements in competition with more established techniques and concepts. Eligible areas include the development of novel insights into subsurface contaminant transport processes, new *in situ* remediation techniques, innovative *in situ* detection and monitoring techniques and novel mechanisms of contaminant removal from the subsurface. Exploratory research projects will be of short term duration and funding. These projects should be viewed as providing an opportunity to conduct preliminary research and to develop novel ideas for later, more substantial funding opportunities within ERSP. Applications submitted to this Science Element should address topics that could lead to breakthroughs in one or more of the other Science Elements in the program and align with the ERSP focus on subsurface processes occurring below the zone of root influence. The contaminants of interest for this Science Element for this Notice are the radionuclide and non-radioactive metal contaminants listed above, as well as nitrate and complexing agents as co-contaminants with the listed radionuclide and non-radioactive metals. NAPL contaminants are not considered at this time for this Science Element for this Notice.

Areas of interest in this Science Element include:

- Novel insights/techniques/methods of relevance to subsurface contaminant detection, transport, remediation or removal.

Funding for single investigator projects under this Science Element should not exceed two years, and should not exceed \$100K per year over the 1-2 year cycle. Continued funding is contingent upon progress of the research and on the availability of funds.

SUPPLEMENTARY INFORMATION

Related Programs

ERSD strongly encourages investigators to familiarize themselves with the resources and potential partnering opportunities provided by ERSD. Leveraging of these resources is strongly encouraged. ERSD funds basic research on subsurface contaminant transport and remediation

processes ranging from molecular scale processes to field scale processes via a unique set of program resources and partnering. Programmatic resources include the Environmental Molecular Science Laboratory (EMSL, <http://www.emsl.pnl.gov/>) located at Pacific Northwest National Laboratory. EMSL is a National Scientific User Facility that supports an array of integrative experimental and computational science resources that are made available to the scientific community. Investigators are strongly encouraged to consider EMSL capabilities in developing applications.

ERSD jointly funds several Environmental Molecular Science Institutes (EMSI) with the National Science Foundation (NSF.) ERSD supported EMSIs are located at Stanford University, Penn State University and Stony Brook University, and are focusing on the fundamental nature of chemical and biological processes occurring at important environmental interfaces (<http://pangea.stanford.edu/research/emsi/index.html>), the kinetics and scaling of biogeochemical processes (<http://www.ceka.psu.edu/>) and the behavior of environmental contaminants in natural and engineered systems (<http://www.cems.stonybrook.edu/>). ERSD also provides support for experimental work at the national synchrotron light sources (see Availability of User Facilities and Other Specialized Resources below).

Biological processes profoundly influence contaminant transport at a variety of scales in the subsurface. ERSD maintains a close relationship with the Genomics:GTL program (<http://doegenomestolife.org/>) and the microbial genome sequencing efforts at the Joint Genome Institute (JGI, <http://www.jgi.doe.gov/>) in order to take advantage of revolutionary genome-enabled and systems biology techniques that promise a more mechanistic understanding of subsurface microbial metabolism affecting contaminant transport.

DOE's substantial computational resources are now being applied to simulations of subsurface reactive transport through ERSD's participation in the SciDAC (Scientific Discovery through Advanced Computing, <http://www.osti.gov/scidac/>) program. The SciDAC program funds computationally intensive research on fundamental science questions using some of the world's most powerful computers.

Integrative research on subsurface biogeochemical processes affecting contaminant metal and radionuclide transport conducted under the former NABIR program (<http://www.lbl.gov/NABIR/index.html>) has brought new insights into the stimulation of subsurface microbial communities to affect contaminant transport from the laboratory to *in situ* field experiments of radionuclide bioremediation at the ERSD Field Research Center (<http://www.esd.ornl.gov/nabirfrc/>), at uranium mill tailing sites (UMTRA, <http://www.pnl.gov/nabir-umtra/index.stm>) and at the Hanford site (<http://esd.lbl.gov/ERT/hanford100h/index.html>). Technology development in support of DOE's subsurface and high level waste cleanup programs to reduce costs and improve efficiency was the focus of the former EMSP program (http://www.sc.doe.gov/ober/ERSD/ersd_emsp.html).

Availability of User Facilities and Other Specialized Resources

The ERSD within the DOE Office of Biological and Environmental Research (http://www.science.doe.gov/ober/ERSD_top.html) has responsibility for programs and facilities that offer unique and complementary resources for the conduct of ERSP research. Potential applicants are encouraged to consider use of these programs/facilities in development of applications.

- The Environmental Molecular Science Laboratory (EMSL) at the Pacific Northwest National Laboratory, (<http://www.emsl.pnl.gov>), is operated by ERSD as a National Scientific User Facility with state-of-the-art instrumentation in environmental spectroscopy (<http://www.emsl.pnl.gov/capabs/esbf.shtml>), high field magnetic resonance spectroscopy (<http://www.emsl.pnl.gov/capabs/hfmrf.shtml>), high performance mass spectrometry (<http://www.emsl.pnl.gov/capabs/hpmsf.shtml>), high resolution electron microscopy (<http://www.emsl.pnl.gov/capabs/insf.shtml>), and high performance computing (<http://www.emsl.pnl.gov/capabs/mscf.shtml>).

The EMSL's high performance supercomputer is available for computational research in the physical, chemical and biological sciences, including geochemistry, groundwater flow and transport simulations, molecular thermodynamics and kinetics, heavy element chemistry, geochemistry, and surface chemistry (<http://www.emsl.pnl.gov/capabs/mscf.shtml>). Remote and on-site access to the 11+ TeraFlops, Linux-based Hewlett-Packard (HP) system and associated software, and visualization and data storage capabilities is available through a separate application and external peer review process. Proposals for allocations of large blocks of time on the EMSL's HP system are solicited annually (usually in February or March for allocations beginning in October). Awards typically average 500,000 hours for multi-investigator teams (<http://mscf.emsl.pnl.gov/about/allocation.shtml>).

DOE also provides compute cycles to the scientific user community at other high performance computing centers. For example, the National Energy Research Scientific Computing Center (NERSC) at the Lawrence Berkeley National Laboratory provides an 888 processor IBM cluster system plus extensive data storage capabilities (<http://www.nersc.gov>). NERSC usually solicits proposals for time allocations in June or July. Proposals are externally peer reviewed and time awards are announced in December. The National Center for Computational Sciences (NCCS) at the Oak Ridge National Laboratory has several supercomputers available to users, including the Cray X1E Phoenix system, the Cray XT3 Jaguar system, and an SGI Altix system (<http://nccs.gov/>). Proposals for time allocations on the various systems at the NCCS may be submitted throughout the year, but 95% of the awards are for “high-impact, grand challenge type projects” (see <http://nccs.gov/accounts/index.html>, for additional information.)

- The ERSD Field Research Center (FRC) at Oak Ridge National Laboratory (<http://www.esd.ornl.gov/nabirfrc/>) provides a DOE site where scientists can conduct field-scale research and obtain DOE relevant samples of soils, sediments, and ground waters for laboratory research. A useful general orientation for prospective investigators is available at http://public.ornl.gov/nabirfrc/workshop2005_posters.cfm
- ERSD (http://www.sc.doe.gov/ober/ober_top.html) provides user support for experiments at synchrotron light sources that are capable of providing structural and chemical information often unavailable with conventional sources of x-rays. DOE laboratories with synchrotrons supporting ERSD research and points of contact include: Argonne National Laboratory (<http://www.aps.anl.gov/index.html>), contact Ken Kemner (kemner@anl.gov); Brookhaven National Laboratory

(<http://www.nsls.bnl.gov/>), contact Jeffrey Fitts (fitts@bnl.gov); Lawrence Berkeley National Laboratory (http://esd.lbl.gov/als_environmental_program/), contact Susan Hubbard (sshubbard@lbl.gov); and Stanford Synchrotron Radiation Laboratory (<http://www-ssrl.slac.stanford.edu/mes/remedi/index.html>), contact John Bargar, bargar@slac.stanford.edu). Use of the synchrotron light sources requires a separate approval process.

Relevance to Mission

A key consideration in the evaluation of research applications will be applicability to the Environmental Remediation Sciences Division (ERSD) mission of environmental remediation and long term stewardship of DOE sites. Applicants will need to identify specific areas of scientific need and make a strong case for the value of the proposed research in helping resolve those needs. The application should explain how resolution of these needs could improve capabilities in site stewardship and/or understanding/controlling subsurface contaminant fate and transport. Therefore, **all applications submitted in response to this Notice must explicitly state how the proposed research will support the accomplishment of the BER Long Term Measure “to provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes into decision making for environmental remediation.”** DOE will also consider, as part of the evaluation, program policy factors including balance among the program areas and research already in progress. Previous research solicitations, abstracts, and research reports of projects funded under the former EMSP can be viewed at: <http://emsp.em.doe.gov/search.jsp>. Previously funded projects and abstracts from the former NABIR program can be viewed at: <http://www.lbl.gov/NABIR/researchprogram/awards/index.html>.

Submission Information

For this Notice, the Project Narrative must be **20 pages or less**, exclusive of attachments, and must contain an abstract or summary of the proposed research (to include the hypotheses being tested, the proposed experimental design, and the names of all investigators and their affiliations). **Applications with Project Narratives longer than 20 pages will be returned to applicants and will not be merit reviewed or considered for award.** Attachments should include short (2 pages) curriculum vitae, QA/QC plan, a listing of all current and pending federal support and Letters of Intent for proposed collaborators (when applicable). Curriculum vitae should be submitted in a form similar to that of NIH or NSF. **Applicants who have current ERSD support must include a Progress Section with a description of results, the funding history (i.e. number of years and amounts per year for all PIs and co-PIs), and a list of publications derived from that funding.**

The Office of Science, as part of its grant regulations, requires at 10 CFR 605.11(b) that a recipient receiving a grant and performing research involving recombinant DNA molecules and/or organisms and viruses containing recombinant DNA molecules shall comply with the NIH "Guidelines for Research Involving Recombinant DNA Molecules," which is available via the world wide web at: <http://www.niehs.nih.gov/odhsb/biosafe/nih/rdna-apr98.pdf>, (59 FR 34496, July 5, 1994,) or such later revision of those guidelines as may be published in the Federal Register.

Grantees must comply with federal and state laws and regulations as appropriate; for example, the Toxic Substances Control Act (TSCA) as it applies to genetically modified organisms. Although compliance with the National Environmental Policy Act (NEPA) is the responsibility of DOE, grantees proposing to conduct field research are expected to provide information necessary for the DOE to complete the NEPA review and documentation.

REFERENCES

Note: World Wide Web locations of these documents are provided where possible. For those without access to the World Wide Web, hard copies of these references may be obtained by contacting Robert T. Anderson at the electronic mail address listed in the FOR FURTHER INFORMATION CONTACT section.

National Research Council, 2000. Research Needs in Subsurface Science, U.S. Department of Energy's Environmental Management Science Program. National Academy Press, Washington, DC. <http://www.nap.edu/browse.html>

Department of Energy, 2001. A Report to Congress on Long-Term Stewardship. Office of Environmental Management. Washington, DC.
http://www.lm.doe.gov/documents/3_pro_doc/lts_study/rpt_to_congress_vol_I.pdf

Davis, J.A.; S.B. Yabusaki; C.I. Steefel; J.M. Zachara; G.P. Curtis; G.D. Redden; L.J. Criscenti; B.D. Honeyman 2004. Assessing Conceptual Models for Subsurface Reactive Transport of Inorganic Contaminants EOS 85, 449-455.
http://www.iscmem.org/Documents/Publication_Davis2004Eos.pdf

PART II – AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT.

DOE anticipates awarding grants under this program announcement.

B. ESTIMATED FUNDING.

It is anticipated that up to a total of \$10 million of Fiscal Year 2007 Federal funds will be available for awards in the Science Element categories described above. An additional sum, up to \$10 million, will be available for competition by DOE National Laboratories under a separate solicitation (Program Announcement LAB 06-12). Three-year funding is anticipated for most awards (with the exception of exploratory awards, 2 yr maximum) in each Science Element of interest, contingent upon the availability of appropriated funds and successful annual progress. Award sizes will be determined by the scope and collaborative nature of the project. Exploratory projects should not exceed \$100K per year over a 1-2 year cycle. Single investigator projects should not exceed \$450K per year over the three year cycle. Collaborative projects involving several research groups or more than one institution conducting integrated research may be funded up to a limit of \$600K per year over the three year cycle of the project. Multi-disciplinary, multi-institution field projects may range up to \$750K per year over a three year cycle. Investigators early in their careers and/or new to DOE's Environmental Remediation Sciences Division are encouraged to apply. The Program Manager is available to discuss new ideas and their alignment with the program.

C. MAXIMUM AND MINIMUM AWARD SIZE.

Ceiling (i.e., the maximum amount for an individual award made under this announcement):
None

Floor (i.e., the minimum amount for an individual award made under this announcement): None

D. EXPECTED NUMBER OF AWARDS.

The number of awards will be contingent on satisfactory peer review, the availability of appropriated funds and the size of the awards.

E. ANTICIPATED AWARD SIZE.

N/A

F. PERIOD OF PERFORMANCE.

N/A

G. TYPE OF APPLICATION.

N/A

PART III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS.

All types of applicants are eligible to apply, except other Federal agencies, Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

Researchers from Federally Funded Research and Development Centers (FFRDCs) or DOE National Laboratories should respond to Program Announcement LAB 06-12, available at the following web address: http://www.science.doe.gov/grants/LAB06_12.html.

B. COST SHARING

Cost sharing is not required.

C. OTHER ELIGIBILITY REQUIREMENTS.

N/A

PART IV – APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE.

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants", and then select "Download Application Package". Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package. NOTE: You will not be able to download the Application Package unless you have installed PureEdge Viewer (See: <http://www.grants.gov/DownloadViewer>).

B. LETTER OF INTENT AND PREAPPLICATION.

1. Letter-of-Intent.

Letters-of-Intent are not required.

2. Preapplication.

Researchers are strongly encouraged to submit a preapplication addressing a specific Science Element of interest for programmatic review. Preapplications should be submitted by April 14, 2006, to allow sufficient time for evaluation of programmatic relevance by DOE and for subsequent preparation of the full application. The preapplication narrative of no more than two pages should consist of a description of the research objectives, hypotheses, approach, and relevance to DOE needs. The preapplication should also include a list of the key investigators, their disciplines and their institutions using at most one page. If no response to the preapplication is received by May 5, 2006 please contact the Program Manager.

Preapplications referencing Program Notice DE-FG02-06ER06-12, and the Science Element of interest should be sent via E-mail attachment to Kim.Laing@science.doe.gov. Use "Program Notice DE-FG02-06ER06-12, Preapplication to [Science Element]" as the subject of the email.

C. CONTENT AND FORM OF APPLICATION – SF 424 (R&R)

You must complete the mandatory forms and any applicable optional forms (e.g., SF-LLL-Disclosure of Lobbying Activities) in accordance with the instructions on the forms and the additional instructions below. **Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.**

1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instructions, turn on the "Help Mode" (Icon with the pointer and question mark at the top of the form). The list of certifications and assurances referenced in Field 18 can be found on the Applicant and Recipient Page at <http://grants.pr.doe.gov>.

2. RESEARCH AND RELATED Other Project Information.

Complete questions 1 through 5 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 6 on the Form)

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to publication. It should be a single page that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click "Add Attachment."

Project Narrative (Field 7 on the form)

The project narrative must not exceed 20 pages, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right). **Applications with Project Narratives longer than 20 pages will be returned to applicants and will not be merit reviewed or considered for award.** The font must not be smaller than 11 point. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. **All applications should be in a single PDF file.** To attach a Project Narrative, click "Add Attachment."

The Research & Related Other Project Information form of the Grants.gov template should be completed in the following manner. **Project Narrative is Field 7 on the form.** The first page of your narrative must include the following information:

Applicant/Institution:

Street Address/City/State/Zip:

Principal Investigator:

Address:

Telephone Number:

Email:

Science Element:

DOE/Office of Science Program Office: Environmental Remediation Science Program

DOE/Office of Science Program Office Technical Contact:

DOE Grant Number (if Renewal or Supplemental Application):

Is this a Collaboration? If yes, please list ALL Collaborating Institutions/Pis and indicate which ones will also be submitting applications. Also indicate the PI who will be the point of contact and coordinator for the combined research activity.

Relevance Statement; single page only, **all applications submitted in response to this Notice must explicitly state how the proposed research will support the accomplishment of the BER Long Term Measure “to provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes into decision making for environmental remediation.”**

Project Narrative, 20 pages or less, exclusive of attachments. Applications with Project Narratives longer than 20 pages will be returned to applicants and will not be reviewed for scientific merit. The project narrative should be a clear statement of the work to be undertaken and should include: objectives for the period of the proposed work and expected significance; relation to the longer-term goals of the principal investigator of the project; and relation to the present state of knowledge in the field, to work in progress by the investigator under other support, and work in progress elsewhere. The statement should outline the general plan of work, including the broad design of experiments to be undertaken, and an adequate description of experimental methods and procedures. Attachments should include short (2 pages) curriculum vitae, QA/QC plan, a listing of all current and pending federal support and Letters of Intent for proposed collaborators (when applicable). Curriculum vitae should be submitted in a form similar to that of NSF. **Applicants who have current ERSD support must include a Progress Section with a description of results, the funding history (i.e. number of years and amounts per year for all PIs and co-PIs), and a list of publications derived from that funding.**

Biographical Sketches (please limit to 2 pages per senior investigator, consistent with NSF guidelines)

Current and Pending Support for each senior investigator

Letters of Intent from collaborators (if applicable)

Facilities and Resources description

Literature Cited

The project narrative must include:

- Project Objectives.
This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.
- Evaluation Phase
This section must include a plan and metrics to be used to assess the success of the project.
- Project Performance Site
Indicate the primary site where the work will be performed. If a portion of the work will be performed at any other sites, identify those sites, also.

- Biographical Sketch Appendix

Provide a biographical sketch for the project director/principal investigator (PD/PI) and each senior/key person listed in Section A on the R&R Budget form. **Provide the biographical sketch information as an appendix to your project narrative. Do not attach a separate file.** The biographical sketch appendix will not count in the project narrative page limitation. The biographical information for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

Research and Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

- Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers. Provide the following information in this section:

Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state "None."

Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last 5 years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates during the past 5 years.

- Current and Pending Support.
Provide a list of all current and pending support (both Federal and non-Federal) for the Project Director/Principal Investigator(s) (PD/PI) and senior/key persons, including subawardees, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

Bibliography & References Cited (Field 8 on the form)

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. **In order to reduce the number of files attached to your application, please provide the Bibliography and References Cited information as an appendix to your project narrative. Do not attach a file in field 8.** This appendix will not count in the project narrative page limitation.

Facilities & Other Resources (Field 9 on the form)

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. **In order to reduce the number of files attached to your application, please provide the Facility and Other Resource information as an appendix to your project narrative. Do not attach a file in field 9.** This appendix will not count in the project narrative page limitation.

Equipment (Field 10 on the form)

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. **In order to reduce the number of files attached to your application, please provide the Equipment information as an appendix to your project narrative. Do not attach a file in field 10.** This appendix will not count in the project narrative page limitation.

Other Attachment (Field 11 on the form)

If you need to elaborate on your responses to questions 1-5 on the “Other Project Information” document, **provide the information as an appendix to your project narrative. Do not attach a file in field 11.**

3. RESEARCH AND RELATED BUDGET.

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See PART IV, G).

Budget Justification (Field K on the form).

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If cost sharing is required, provide an explanation of the source, nature, amount and availability of any proposed cost sharing. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

4. R&R SUBAWARD BUDGET ATTACHMENT(S) FORM.

Budgets for Subawardees, other than DOE FFRDC Contractors. You must provide a separate cumulative R&R budget for each subawardee that is expected to perform work estimated to be more than \$100,000 or 50 percent of the total work effort (whichever is less). If you are selected for award, you must submit a multi-year budget for each of these subawardee (See Section IV.D for submission of Subawardees' multi-year budgets). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and e-mail it to each subawardee that is required to submit a separate budget. Note: Subawardees must have installed PureEdge Viewer before they can complete the form. After the Subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee's name (plus .xfd) as the file name (e.g., ucla.xfd or energyres.xfd).

5. SF-LLL Disclosure of Lobbying Activities

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS.

The Department anticipates that no additional submissions will be required. However, it

reserves the right to request additional or clarifying information for any reason deemed necessary.

E. SUBMISSION DATES AND TIMES.

1. Preapplication Due Date.

Researchers are strongly encouraged to submit a preapplication addressing a specific Science Element of interest for programmatic review. Preapplications should be submitted by April 14, 2006, to allow sufficient time for evaluation of programmatic relevance by DOE and for subsequent preparation of the full application. The preapplication narrative of no more than two pages should consist of a description of the research objectives, hypotheses, approach, and relevance to DOE needs. The preapplication should also include a list of the key investigators, their disciplines and their institutions using at most one page. If no response to the preapplication is received by May 5, 2006 please contact the Program Manager.

Preapplications referencing Program Notice DE-FG02-06ER06-12, and the Science Element of interest should be sent via E-mail attachment to Kim.Laing@science.doe.gov. Use "Program Notice DE-FG02-06ER06-12, Preapplication to [Science Element]" as the subject of the email.

2. Application Due Date.

The deadline for receipt of formal applications is 8:00 P.M., Eastern Time, June 15, 2006, in order to be accepted for merit review and to permit timely consideration for award in early Fiscal Year 2007. You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

F. GOVERNMENTAL REVIEW .

This program is subject to Executive Order 12372 (Intergovernmental Review of Federal Programs) and the regulations at 10 CFR Part 1005.

One of the objectives of the Executive order is to foster an intergovernmental partnership and a strengthened federalism. The Executive order relies on processes developed by State and local governments for coordination and review of proposed Federal financial assistance.

Applicants should contact the appropriate State Single Point of Contact (SPOC) to find out about, and to comply with, the State's process under Executive Order 12372. The names and addresses of the SPOCs are listed on the Web site of the Office of Management and Budget at <http://www.whitehouse.gov/omb/grants/spoc.html>.

G. FUNDING RESTRICTIONS.

Cost Principles. Costs must be allowable in accordance with the applicable Federal cost

principles referenced in 10 CFR Part 600.

Pre-award Costs. Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit.

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD. Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process.

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See www.grants.gov/GetStarted). **We recommend that you start this process at least two weeks before the application due date.** It may take 14 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at <http://www.grants.gov/assets/OrganizationRegCheck.doc> to guide you through the process. **IMPORTANT:** During the CCR registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner identification Number" (MPIN).

Part V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria.

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b).

2. Merit Review Criteria.

Applications will be subjected to formal merit review (peer review) and will be evaluated against the following evaluation criteria which are listed in descending order of importance codified at 10 CFR 605.10(d):

1. Scientific and/or Technical Merit of the Project;
2. Appropriateness of the Proposed Method or Approach;
3. Competency of Applicant's Personnel and Adequacy of Proposed Resources;
4. Reasonableness and Appropriateness of the Proposed Budget.

Progress on previous ERSD funded research will be an important criterion for evaluation. As part of the evaluation, program policy factors also become a selection priority. Note, external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Federal and non-federal reviewers will be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

Relevance to Mission

A key consideration in the evaluation of research applications will be applicability to the Environmental Remediation Sciences Division (ERSD) mission of environmental remediation and long term stewardship of DOE sites. Applicants will need to identify specific areas of scientific need and make a strong case for the value of the proposed research in helping resolve those needs. The application should explain how resolution of these needs could improve capabilities in site stewardship and/or understanding/controlling subsurface contaminant fate and transport. Therefore, **all applications submitted in response to this Notice must explicitly state how the proposed research will support the accomplishment of the BER Long Term Measure “to provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes into decision making for environmental remediation.”** DOE will also consider, as part of the evaluation, program policy factors including balance among the program areas and research already in progress. Previous research solicitations, abstracts, and research reports of projects funded under the former EMSP can be viewed at: <http://emsp.em.doe.gov/search.jsp>. Previously funded projects and abstracts from the former NABIR program can be viewed at: <http://www.lbl.gov/NABIR/researchprogram/awards/index.html>.

B. REVIEW AND SELECTION PROCESS.

1. Merit Review.

Applications will be subjected to formal merit review (peer review) and will be evaluated against the evaluation criteria codified at 10 CFR 605.10(d) listed above, as well as the additional criteria listed above.

2. Selection.

The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

3. Discussions and Award.

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600 and 605; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES.

DOE is striving to make awards within eight months. The time interval begins on the date applications are due or the date the application is received, if there is no specified due date/deadline.

Part VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES.

1. Notice of Selection.

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV.G with respect to the allowability of pre-award costs.)

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award.

A Notice of Financial Assistance Award issued by the contracting officer is the authorizing award document. It normally includes, either as an attachment or by reference: 1. Special Terms and Conditions; 2. Applicable program regulations, if any; 3. Application as approved by DOE; 4. DOE assistance regulations at 10 CFR Part 600, or, for Federal Demonstration Partnership (FDP) institutions, the FDP terms and conditions; 5. National Policy Assurances to Be Incorporated As Award Terms; 6. Budget Summary; and 7. Federal Assistance Reporting Checklist, which identifies the reporting requirements.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS.

1. Administrative Requirements.

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR Part 600 and 10 CFR Part 605 (See: <http://ecfr.gpoaccess.gov>), except for grants made to Federal Demonstration Partnership (FDP) institutions. The FDP terms and conditions and DOE FDP agency specific terms and conditions are located on the National Science Foundation web site at http://www.nsf.gov/awards/managing/fed_dem_part.jsp.

2. Special Terms and Conditions and National Policy Requirements.

Special Terms and Conditions and National Policy Requirements.

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at <http://grants.pr.doe.gov>. The National Policy Assurances To Be Incorporated As Award Terms are located at <http://grants.pr.doe.gov>.

Intellectual Property Provisions.

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www.gc.doe.gov/techtrans/sipp_matrix.html.

C. REPORTING.

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F4600.2, attached to the award agreement.

PART VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the “Submit Question” feature of the DOE Industry Interactive Procurement System (IIPS) at <http://e-center.doe.gov>. Locate the program announcement on IIPS and then click on the “Submit Question” button. Enter required information. You will receive an electronic notification that your question has been answered. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE cannot answer these questions.

Questions regarding the program (**technical**) requirements should be directed to:

Agency Contacts:

For specific information on DOE interests, contact:

Dr. Robert T. Anderson
Environmental Remediation Sciences Division
SC-23.4/Germantown Building
Office of Biological and Environmental Research
Office of Science
U.S. Department of Energy
1000 Independence Ave., SW
Washington, D.C. 20585-1290
Telephone: (301) 903-5549
E-mail: Todd.Anderson@science.doe.gov
Fax: (301) 903- 4154

PART VIII - OTHER INFORMATION

A. MODIFICATIONS.

Notices of any modifications to this announcement will be posted on Grants.gov and the DOE Industry Interactive Procurement System (IIPS). You can receive an email when a modification or an announcement message is posted by joining the mailing list for this announcement through the link in IIPS. When you download the application at Grants.gov, you can also register to receive notifications of changes through Grants.gov.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE.

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS.

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

D. PROPRIETARY APPLICATION INFORMATION.

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

“The data contained in pages _____ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government’s right to use or disclose data obtained without restriction from any source, including the applicant.”

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

“The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation.”

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL.

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application.

Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM.

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See “Notice of Right to Request Patent Waiver” in paragraph G below.)

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE’s own needs or to insure the commercialization of technology developed under a DOE agreement.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER.

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. N/A

I. N/A